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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/935,002	08/21/2001	Tae-Pok Rhee	5484-92	9272
20575	7590	11/05/2004	EXAMINER	
MARGER JOHNSON & MCCOLLOM PC 1030 SW MORRISON STREET PORTLAND, OR 97205			TSAL, H JEY	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 11/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/935,002

Applicant(s)

RHEE, TAE-POK

Examiner

H.Jey Tsai

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-51 is/are pending in the application.
- 4a) Of the above claim(s) 17-24 and 41-48 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-16, 25-40 and 49-51 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

***Election/Restrictions***

This application contains claims 17-24 and 41-48 are drawn to an invention nonelected claims. A complete reply to the final rejection must include cancellation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 1 recites the limitation "said cylindrical insulator". There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-16, 25-40 and 50-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over JP404302406, newly cited, in view of Sundaram et al. 5,372,967 and Lue 5,863,806, previously cited.

The reference(s) teach the features :

JP '406 substantially discloses a method of forming an inductor on the semiconductor device, which includes :

depositing a conductive material layer over the insulating layer 1<sub>2</sub> having the groove, fig. 1 and English abstract (attached),

patterning the conductive material layer 3 to form underlying conductive lines with a predetermined distance therebetween on said groove, fig. 2,

forming a cylindrical insulating insulator 2/4 in the groove formed with the underlying conductive lines and on the surface of said substrate 1<sub>1</sub>, wherein an upper portion of the cylindrical insulator 2/4 protrudes from an upper surface of the groove, and forming upper conductive lines 5, the insulator 2/4 to contact with said underlying conductive lines 3, wherein the upper conductive lines 5 extend up and around the upper portion of the cylindrical insulator 2/4 to form a rounded upper conductive line, the upper conductive lines having a substantially uniform thickness conformally formed on the insulator.

Sundaram et al. substantially discloses a method of forming an inductor on the semiconductor device, which includes:

forming a groove with a spiral shape or other shapes in the insulating layer 11, fig. 4+,

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forming a conductive layer 18 on the groove,  
forming cylindrical insulator 17/19 contacting the conductive lines 18, col. 3, lines 18+,  
forming upper conductive lines 23 contacting the underlying conductive layer 18 to form an inductor, figures 5 and 6.

The difference between the reference(s) and the claims are as follows: JP406 teaches forming an inductor with a cylindrical insulator formed in the groove of insulating layer but the English abstract does not clearly indicating the insulator contacting with underlying conductive lines, photolithographic patterning process and an oxidizing layer. However, Suudaram et al. teaches at 3, lines 29+ and fig. 4, forming a inductor core in the groove by forming insulator 17 and insulator 19 that is contacting the underlying conductive lines 18, etching conductive layer 18 and patterning to form conductor layer 23. And, Lue teaches at fig.1-3, col. 3, lines 35+ and col. 2, lines 47+, forming a nitride layer 34 and photolithographic patterning process to form a groove in the insulating layer, forming lower conductive lines 36 on the groove, the lower conductive lines 36 spaced apart from each other, see fig. 1, growing the oxidizable material layer by oxidation to form a cylindrical insulating layer 38 in the groove such that an upper portion of the cylindrical insulator protrudes from an upper surface of the groove, forming upper conductive lines 48 on the insulator 38/44 to be in contact with the underlying lower conductive lines 36.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have recognized that JP 406's insulator contacting the

underlying conductive lines as taught by Sundaram et al. because the insulator must adhere to the conductive lines so that insulator core can stay inside the inductor. And, photolithographic patterning is known to form a conductor lines as taught by Sundaram and Lue, and cylindrical insulator can be formed over the groove with rounded shape in the upper surface as taught by Lue because the bottom of groove become rounded during the etching of insulating film, and the material increases volume during oxidation so that cylindrical insulator is formed over the surface of the groove.

Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over JP404302406, newly cited, in view of Yamada et al. 6,236, previously cited.

The reference(s) teach the features:

JP '406 substantially discloses a method of forming an inductor on the semiconductor device, which includes:

forming a semicircular groove in an insulating layer 1<sub>2</sub> on a semiconductor substrate 1<sub>1</sub>, fig. 1,

forming an inductor having a cylindrical cross-section 2/4 in the groove, wherein an upper portion of the cylindrical cross-section protrudes 2/4 from an upper surface of the groove.

The difference between the reference(s) and the claims are as follows: JP '406 teaches forming an inductor with a cylindrical insulator formed in the groove of insulating layer but does not clearly teaches the semicircle groove having a rounded

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circumference. However, Yamada et al. teaches forming an inductor having a rounded semicircle grooves in figures 35 and 36 in the insulating layer 1a, 1b.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form a groove with rounded semicircle as suggested by Yamada et al. because the bottom of groove become rounded during the etching.

### ***Conclusions***

Applicant's arguments filed on August 19, 2004 have been fully considered but they are not persuasive. Because JP '406 clearly teaches forming the upper conductive lines 5 having a substantially uniform thickness conformally formed on the insulator 2/4. And, Sundaram et al. clearly teaches at fig. 5, col. 3, lines 18+, the upper conductive lines 23 having a substantially uniform thickness conformally formed on the cylindrical insulator 19 and groove is a spiral shape, hence, from figs. 4-5, the groove is a semicircle with a cylindrical insulator formed inside. And, Yamada also teaches a semicircle groove in figs. 35A and 35B with insulator inductor core 1a, 1b or 41 formed inside. And, Lue teaches at fig.1-2 and col. 2, lines 47+, a cylindrical insulator formed in the groove and over the groove with rounded shape.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry of a general nature or clerical matters or relating to the status of this application or proceeding should be directed to the Group customer service whose telephone number is (703) 308-4357.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to H. Jey Tsai whose telephone number is (571) 272-1684. The examiner can normally be reached on from 7:00 Am to 4:00 Pm., Monday thru Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling can be reached on (571) 272-1679.

The fax phone number for this Group is (703) 872-9306.

hjt

10/28/04



H. Jey Tsai  
Primary Examiner  
Patent Examining Group 2800